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ABSTRACT

The Man and the Biosphere Programme (MAB) was launched in November 1971 under the auspices of Unesco. Its aim is to help to develop scientific knowledge with a view to the rational management and conservation of natural resources, to train qualified personnel in this field, and to disseminate the knowledge acquired both to the decision-makers and the population of various countries. Included in this bulletin are discussions of MAB's role, structure, goals, activities (including environmental education and training and the development of an international network of protected areas called biosphere reserves), and themes. Two major themes concern man as a part of the biosphere and interdisciplinary participation in MAB projects. A list of 14 major MAB project areas is also provided. These areas include ecological effects of increasing human activities on tropical and subtropical forest ecosystems, perception of environmental quality, and research on environmental pollution and its effect on the biosphere. Brief comments on MAB information materials and a flow chart illustrating the organization of MAB national committees are included in an appendix. (BC)

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Backgrounder: the MAB programme

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Backgrounder: the MAB programme

In late 1982 the MAB programme covered 1,030 field research projects associating over 10,000 researchers in 79 countries.

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All life is concentrated in the fine layer of soil, air and water which surrounds our planet, i.e. the *biosphere*. This is made up of a multitude of *ecosystems*, each forming an entity circumscribed in space and time, including not only all the organisms inhabiting it—the populations of animals, plants and other living organisms, including of course man—but also the physical conditions of climate and soil, together with all the interactions between the organisms themselves and with the physical conditions.

An example of an ecosystem would be a tropical forest, at a given place and time, with the thousands of species of plants, animals and microbes living in its soil and air space, the millions of specific interactions taking place between them, the various influences exerted on the life of these innumerable beings by climate and soil, and the changes they undergo as a result of the organisms' varied activities and of the very existence of the forest.

Man did not originally make any greater impact on these ecosystems, of which he was an integral part, than any other species of mammal. However, once he had mastered fire and invented tools and agriculture, he began to be able to modify profoundly the initial equilibrium and slow evolution of the 'natural' environment. These technical advances enabled him to transform his immediate environment so as to make life in it less difficult, but by leaning ever more heavily on the equilibria of ecosystems.

As a result of the giant strides of science and technology, the impetus thus given to the rapid growth of modern industries, the population explosion and the development of vast conurbations accounting for nearly half the world's population have put man in a position to wield such influence over his surroundings that any ill-considered action might introduce into the biosphere powerfully disruptive and destabilizing factors which could result in irreversible damage.

A forerunner: the International Biological Programme

In response to this problem the scientific community stepped up the research it had begun in the 1950s. The year 1964 saw the advent of the International Biological Programme (IBP), the main purpose of which was to mobilize researchers, make available to them the most sophisticated technological instruments and muster the necessary resources to this end, not only as in the past in order to study particular components of a given ecosystem but also to understand the overall functioning of the system.

The IBP, which came to an end in 1974, had some marked successes. But like all forerunners, it had weaknesses and the general changes which took place in the world while it was being carried out made it impossible to cure them. In particular, the IBP did not put enough emphasis on the study of the areas where neighbouring ecosystems meet, that is to say, the *interfaces*, though these are the most ecologically critical areas. Hence the need to promote a more comprehensive approach. Above all, the IBP remained a programme run solely by specialists in the natural sciences, and therefore took little account of social and economic data in the study of ecosystems. It had no training component, and its implementation required such considerable technical and material resources that most developing countries were in fact unable to take part.

At the same time, the ecological movement appeared in the developed countries, and the leaders of the Third World began to be aware of the degree of interpenetration between environment and development. It became urgent to open up ecological research to the aspirations of man, of all men, and to take action to meet the practical needs of each human community.

What is MAB?

Bearing in mind the lessons drawn from the successes and shortcomings of the IBP, the Man and the Biosphere Programme (MAB) was launched in November 1971 under

the auspices of Unesco. Its aim is to help to develop scientific knowledge with a view to the rational management and conservation of natural resources, to train qualified personnel in this field and to disseminate the knowledge acquired both to the decision-makers and the population of each country.

Man as the 'outsider', man as the 'insider'

Originally MAB was mainly concerned with man as the 'outsider', that is to say the impact of his activity on ecosystems. Subsequently, man himself came gradually to be considered as part of ecosystems and the biosphere, becoming in fact the central element of study. The study of man from the 'inside' means that MAB is directed to the problems of man in relation to his environment, the programme being focused on his aspirations and needs. In the service of man, science and technology must be integrated with the culture of each country, and the action taken must be in line with each country's particular social and economic features.

Participation

The theme of 'participation' thus became central for the new generation of MAB activities. With the complexity of environmental problems, both in their origins and in their implications, it became essential not only to have recourse to a great many scientific and technological disciplines—botany, zoology, climatology, soil science, physical geography, biochemistry and biology, mathematics—but also to draw upon the social and human sciences, including the skills of planners.

This interdisciplinary approach, associating all kinds of scientists and decision-makers, makes it possible to take into account not only the many factors which characterize a given situation but also the interactions which inevitably exist between them.

Nevertheless participation would obviously be incomplete if it were confined solely to specialists, however

diverse their training and responsibilities. MAB therefore endeavours to associate the local population as closely as possible with the conduct of projects so as to take account of their concerns and enable them to derive benefit from them.

For instance, the MAB project being carried out in the Pays d'Enhaut (Switzerland) is aimed at working out a rational development plan taking into consideration the natural resources of the locality, its ecological vulnerability—increased by tourism and particularly winter sports—and above all the desire of the population to remain a full-time farming community. This project brings together agronomists, sociologists, biologists and economists. The deliberate participation of the inhabitants goes well beyond mere explanatory meetings, for a MAB Association has been established to institute and add to the essential dialogue between inhabitants and experts.

Acting in the field

Being somewhat confined to the laboratory, and often carried out on a sectoral basis and in very special ecological and socio-cultural contexts, environmental and natural resources research is liable to be of but little immediate usefulness.

MAB is engaged in supplying the scientific information needed to overcome the practical problems of natural resources management, including both exploitation and conservation, which are considered as having priority by populations, planners and scientists alike, who have to deal with them daily on the spot. The programme therefore gives pride of place to action and experimental work in the field based on the simplest possible principles and practical arrangements. It sets out to provide decision-makers with scientific advice that is sound and clear enough for them to be able to select, in the light of all the factors involved, a course of action which will be appropriate to the problems faced. The programme must be implemented with the utmost flexibility so as to cater for the changing needs and emergent priorities of the countries concerned.

An example is a sub-desert area in northern Kenya. Here the extremely subtle and complex traditional practices of nomadic pastoral populations come into conflict, firstly, with innovations due to 'modernization' (the prospection of raw materials, international trade, the present-day boundaries of states and the establishment of permanent human settlements around water points), and secondly with overgrazing. This causes intensified desertification. The MAB 'Integrated Project on Arid Lands' (IPAL) seeks to determine the changes undergone by an arid zone ecosystem, and in particular to study modifications and possible alternatives to traditional nomadic practices. Specialists in climate, hydrography, geology, soils, vegetation, wild and domestic animal life, pastoral practices and history are taking part in the project, which has recently passed from the stage of purely theoretical study to practical work aimed at the effective rehabilitation of this arid region.

Environmental training and education

Many developing countries lack a corps of trained specialists in the ecological and related sciences to carry out MAB problem-oriented research. Moreover, some of the training received by students from developing countries has not been relevant to the goals and priorities of their regions or to their particular development problems. Training therefore represents a key element of MAB and is closely linked to research activities in respect of land and natural resources management.

A growing number of training activities are accordingly being carried out in developing countries themselves, under ecological and socio-economic conditions as close as possible to those in which the trainees will later have to work. Sites of MAB field projects are used for training purposes, so that students have the opportunity to learn by observing or participating fully in the research being carried out.

In a wider context, some of these sites are used to create awareness of problems, by means of demonstration and

training activities, among government officials, planners, technicians and even the local populations.

For instance, in the 1981-1983 triennium alone, in addition to the actual field training carried out with support from MAB National Committees, and for which study grants will be provided, at least eight regional courses will be organized by regional institutions of developing countries, and twenty courses by specialized institutes of industrialized countries for experts from developing countries.

Pre-eminence of national priorities

Being concerned with the problems of people and focussed on their needs, MAB activities must reflect the extreme diversity of the conditions under which they live. The programme is therefore naturally based on national priorities and initiatives.

MAB operates through National Committees established by Unesco Member States. Thus in order to ensure that research and training programmes are drawn up in the light of the most urgent needs, as determined by planners and the inhabitants of the countries concerned, and bearing in mind scientific requirements, government representatives are associated with experts from the scientific community in implementing MAB.

For example, when the Mexican authorities decided in 1974 to create the Mapimi reserve in the state of Durango, they were faced with the major problem of how to protect representative samples of ecosystems and further the interests of the inhabitants by obtaining the maximum yield from the land. The MAB programme helped to solve this. The state of Durango purchased specific areas of the reserve, to be used exclusively for integral conservation and research, while the peasant farmers and stock-breeders were resettled in reserves which became experimental areas forming a kind of shock-absorption belt. Here, in order to replace the proteins previously supplied by the meat from a race of turtles that was dying out, the area's cattle-raising capacity has been increased. The introduc-

tion of bee-keeping has made it possible to exploit natural resources more fully while respecting the environment. The reserve is managed by associations presided over by the governor of the state, consisting of representatives of the local populations and of various scientific organizations. The experience acquired will provide guidance for new legislation and for the management of a new reserve set up in the south of Mexico.

Role of an international programme

The need to decentralize programme activities must not be allowed to result in the fragmentation or dissipation of the knowledge needed. MAB therefore provides for co-ordination between the various projects and the widest possible dissemination of the information gathered as projects proceed.

Through MAB, projects in comparable ecological zones are linked up, thus facilitating the co-ordination of current research and exchanges of information by means of regional and international networks. Furthermore, such projects generally have the benefit of the experience and knowledge acquired by institutions working on similar subjects in other ecological zones.

Flexible and low-cost arrangements such as regular contacts between researchers and the rotation of specialists help to improve co-ordination of the various MAB activities. The necessarily limited financial and human resources available to the programme are thus used more effectively and the risk of duplication reduced. Research co-ordinated in this way also produces results which exceed the sum of the individual national efforts.

The fact is that most Member States are subject to budgetary constraints, and many are seriously short of skilled personnel. The MAB programme provides structures making for the best possible use of resources and of international co-operation through the harmonizing and mobilizing of each country's efforts, thus optimizing the available human and financial resources.

Biosphere reserves

An international network of protected areas—called *biosphere reserves*—has been established under the MAB programme.

Conservation is one major objective of biosphere reserves, reflecting an integrated concept under which all the species composing the ecosystems of a reserve must be preserved.

A biosphere reserve contains both natural areas and areas modified by human activity. Thus there is an untouched 'core' area, and a 'buffer' zone where both practical work and experiments are carried out.

Long-term research is being undertaken in biosphere reserves on the structure, functioning and dynamics of ecosystems and on comparisons between ecosystems, thereby providing baseline data for other MAB research projects. Training, popularization and information exchange activities also take place in these reserves.

Biosphere reserves are selected not for their uniqueness but because they are representative of particular ecosystem types. All the ecosystems and biogeographical provinces of the world are being systematically covered. By mid-1982, 215 sites in 58 countries had been designated as biosphere reserves.

The creation of a biosphere reserve in no way affects the sovereignty of any state. Indeed the countries themselves propose the sites. Proposals are considered by the MAB Bureau and, if accepted, are included in the international network of biosphere reserves.

The major MAB project areas

1. Ecological effects of increasing human activities on tropical and subtropical forest ecosystems.

2. Ecological effects of different land uses and management practices on temperate and Mediterranean forest landscapes.

3. Impact of human activities and land use practices on grazing lands: savannah and grassland (from temperate to arid areas).

4. Impact of human activities on the dynamics of arid and semi-arid zones' ecosystems, with particular attention to the effects of irrigation.

5. Ecological effects of human activities on the value and resources of lakes, marshes, rivers, deltas, estuaries and coastal zones.

6. Impact of human activities on mountain and tundra ecosystems.

7. Ecology and rational use of island ecosystems.

8. Conservation of natural areas and of the genetic material they contain.

9. Ecological assessment of pest management and fertilizer use on terrestrial and aquatic ecosystems.

10. Effects on man and his environment of major engineering works.

11. Ecological aspects of urban systems with particular emphasis on energy utilization.

12. Interactions between environmental transformations and the adaptive, demographic and genetic structure of human populations.

13. Perception of environment quality.

14. Research on environmental pollution and its effect on the biosphere.

The MAB structure

MAB is a decentralized programme, promoted by Unesco in all its fields of activity, operating through a framework of National Committees which co-ordinate its activities. Established so far in 102 countries, these committees usually comprise scientists from universities of national research institutions and representatives of other public or private bodies concerned with environmental research and management.

The International Co-ordinating Council, comprising 30 members elected by the General Conference of Unesco from among representatives of the Organization's Member States, is the main policy-making body of MAB. It meets

every two years to review and assess progress being made in implementing the programme. A small Secretariat of Unesco staff members ensures overall co-ordination at the international level.

MAB co-operates closely with a large number of organizations in the United Nations system. These include the Food and Agriculture Organization (FAO), the United Nations Environment Programme (UNEP), the World Health Organization (WHO), the World Meteorological Organization (WMO), the International Council of Scientific Unions (ICSU) and the International Union for Conservation of Nature and Natural Resources (IUCN). (Example: Organization chart—*see page 14*).

Conclusion

Being original in its approach, flexible in its execution and decentralized in implementation, MAB enables all countries, consequently also the developing countries, gradually to acquire autonomy in the field of ecology, so that they can continue their activities under the programme while intensifying the co-operative relations established regionally and interregionally.

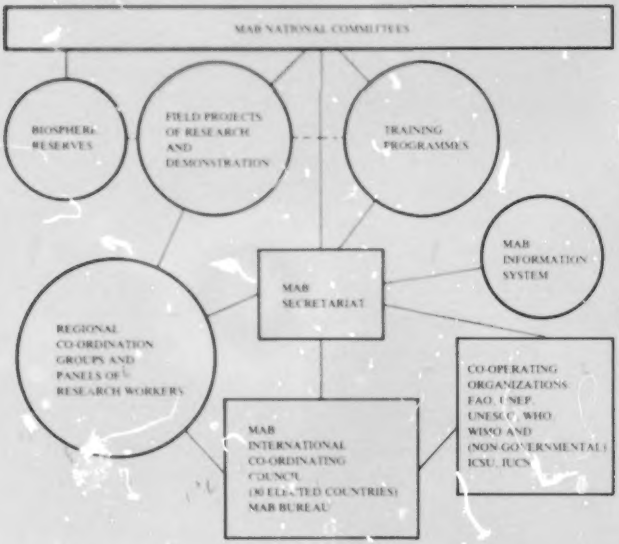
Ten years after its launching, the 'Man and the Biosphere' programme is undoubtedly a success and is constantly expanding, primarily because the participating countries have managed to make it part and parcel of their own development processes.

Annex: MAB information materials

A major objective of MAB is to transmit scientific information relating to resource management to those who can make use of it. One important aspect of this task is to present scientific and technical information in a form which can be understood and used by planners, decision-makers and educators.

A computerized information system for field research projects and biosphere reserves supplies detailed information on objectives, publications, research sites, participating scientists, etc. *The MAB Technical Notes Series* provides methodological guidelines for integrated ecological research, usually with contributions by specialists on a given subject. Two worldwide *State of Knowledge Reports* have been published, one on tropical forest ecosystems and the other on tropical grazing lands. *The MAB Report Series* contains the reports of expert panels, international working groups and task forces convened during the planning phase of MAB, as well as reports of regional and subregional meetings and of MAB Council sessions. The *MAB Audio-visual Series* comprises slides and cassettes on various themes dealt with by the MAB programme. All of these information materials on MAB are produced in several languages. In addition, the co-operating countries themselves produce many scientific publications, brochures, newsletters, films, slide-tape shows, etc.

The exhibition 'Ecology in Action', prepared in 1981 for the tenth anniversary of the programme, has done much to communicate MAB research findings to non-specialists. Five main themes are treated: integrated approaches to land use; tropical forests; marginal lands (arid zones, mountainous regions); cities and urbanization; conservation of nature. Designed in 'poster' form, the exhibition has been produced in hundreds of copies and in three language versions (English, French, Spanish).


MAB NATIONAL COMMITTEES
BIOSPHERE RESERVES
FIELD PROJECTS OF RESEARCH AND DEMONSTRATION
TRAINING PROGRAMMES
MAB INFORMATION SYSTEM
MAB SECRETARIAT
REGIONAL CO-ORDINATION GROUPS AND PANELS OF RESEARCH WORKERS
CO-OPERATING ORGANIZATIONS FAO, UNEP, UNESCO, WHO, WMO AND (NON-GOVERNMENTAL) ICSU, IUCN
MAB INTERNATIONAL CO-ORDINATING COUNCIL (30 ELECTED COUNTRIES) MAB BUREAU